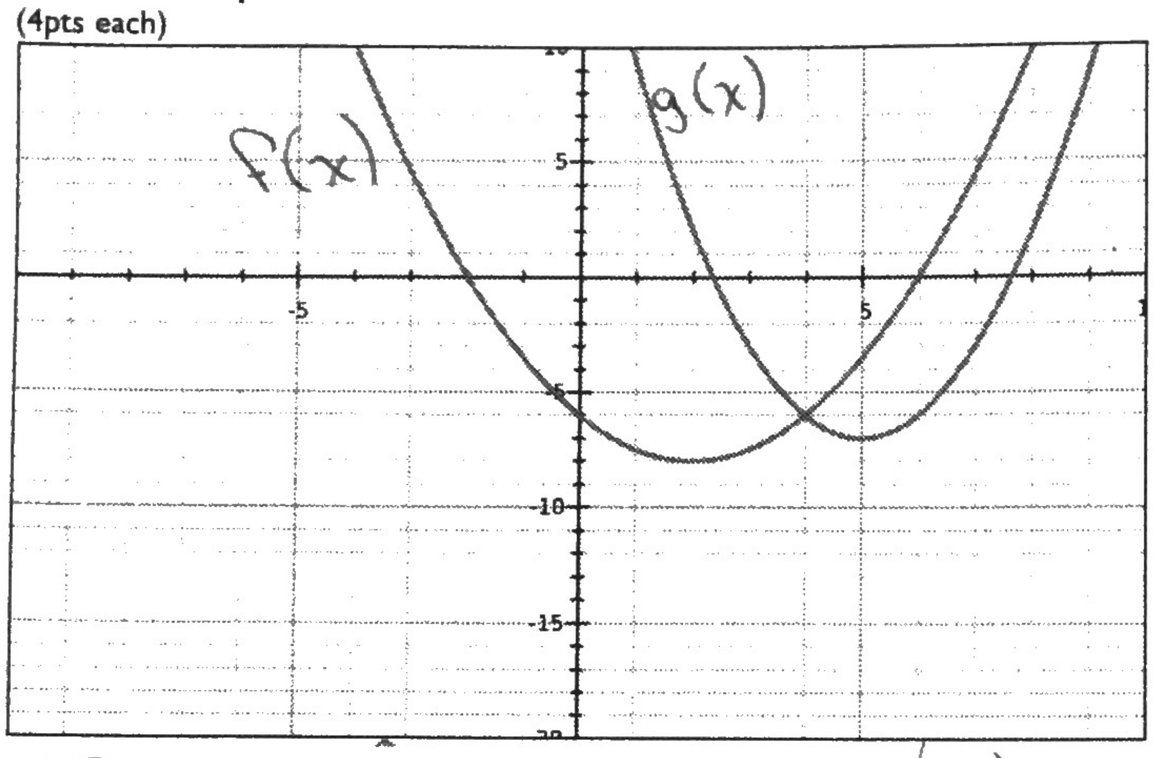
Algebra 2 Honors Final Exam 2016 – 2017 PRACTICE TEST

Directions:

Solve each problem as asked. **Read** the question and **answer** the question asked. **Show all of your work.** Any work shown for multiple-choice questions can earn you partial credit for that problem if I understand how you arrived at your answer.

Please **box your answer** for each problem.

1) Look at the graph below.
   a. Find the equation of the two functions in standard, factored, or vertex form (only one form). (4pts each)



$f(x) = \frac{1}{2}(x-2)^2 - 8$

$f(x) = \frac{1}{2}(x+2)(x-6)$

$f(x) = \frac{1}{2}x^2 - 2x - 6$

$g(x) = (x-5)^2 - 7$

$g(x) = x^2 - 10x + 18$

   b. Then find the **solutions to the system of the two equations**. You must **show how you arrived at your solution algebraically** in order to earn credit for this question. (5pts)

$\frac{1}{2}x^2 - 2x - 6 = x^2 - 10x + 18$

$x^2 - 4x - 12 = 2x^2 - 20x + 36$

$x^2 - 16x + 48 = 0$

$(x-4)(x+12) = 0$

$x = 4, -12$

(4, -6)

(12, 42)

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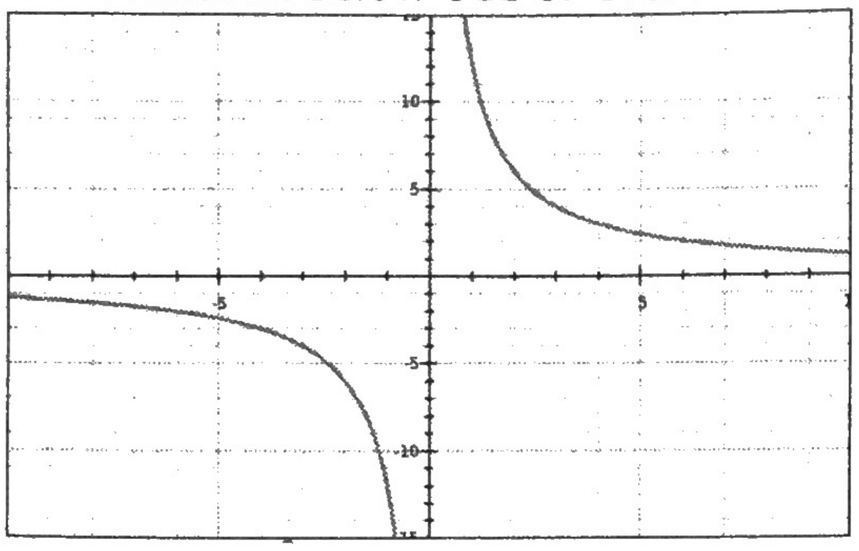
2) Is the function below odd or even? Tell how you know that this is true. (2pts)



This is odd.

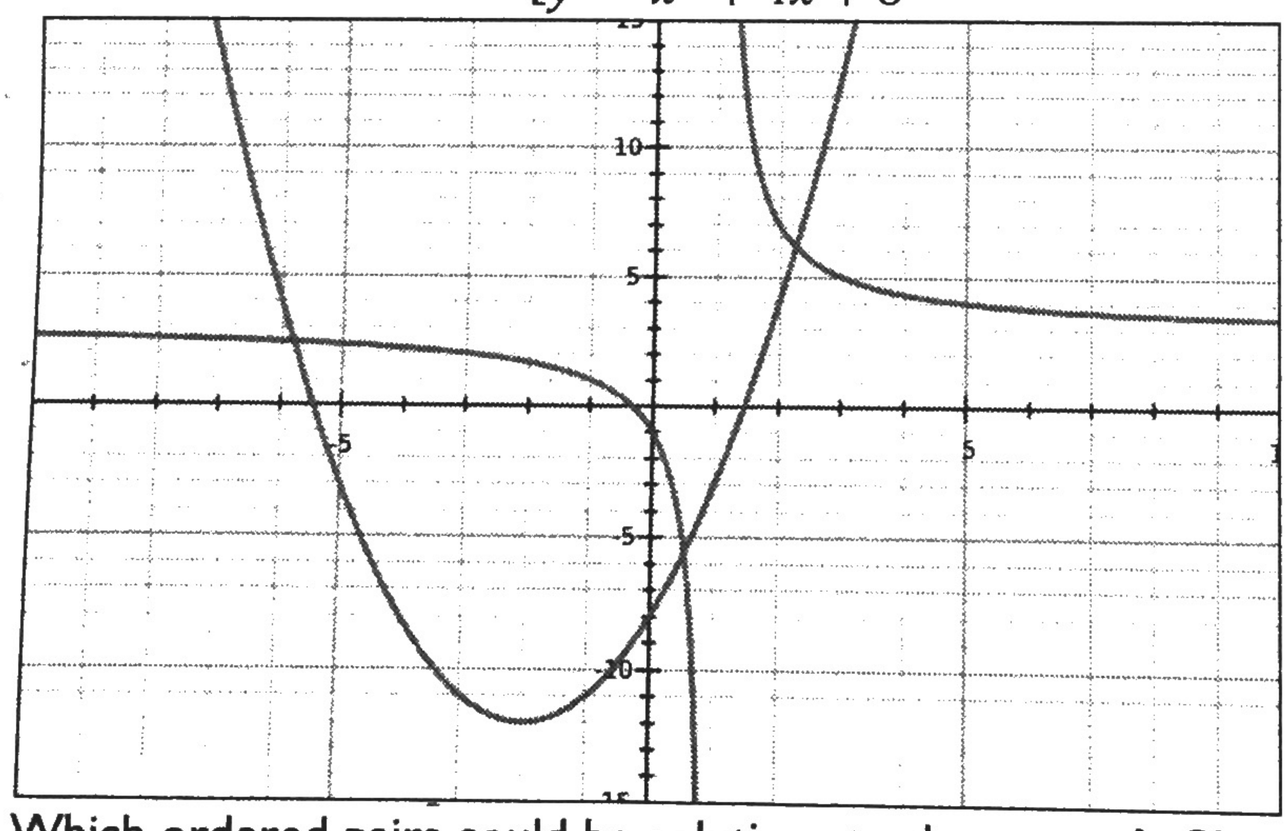
$y = \frac{12}{x}$

$-y = \frac{12}{-x}$

3) For an unknown polynomial function $p(x)$, $p(6) = 4$. What do you know about $p(x)$? (2pts)

a. $x - 6$ is a factor
b. $x - 6$ is not a factor
c. The graph of $p(x)$ crosses the x-axis at -6

4) The graph of the system $\begin{cases} y = \frac{4}{x-1} + 3 \\ y = x^2 + 4x + 8 \end{cases}$ is shown.



Which ordered pairs could be solutions to the system? Choose all that apply. (2pts)

a. (2.35, 6) and (-5.8, 2.27)
b. (1.6, 0) and (0, -10)
c. (-2.35, -6) and (5.8, 2.27)

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5) Kellin is working to throw a lacrosse ball farther. Currently (day 0), she can throw it 2 yards. After one day of practice, she can throw is **3** yards. After two days of progress, she can throw the ball **6** yards. After three days of progress, she can throw the ball **11** yards.

a. Write an equation to model this situation. (4pts)

x	y
0	2
1	3
2	6
3	11

$a = 1$

$c = 2$

$y = ax^2 + bx + c$

$3 = 1(1)^2 + 1b + 2$

$0 = b$

$\boxed{y = x^2 + 2}$

b. If this process continues, how many yards will she be able to throw it by **Day 9**?) (2pts)

$y = 9^2 + 2$

$\boxed{y = 83 \text{ yd.}}$

c. If this process continues, what is the **total number** of yards she will have thrown it during these times she is measuring? (4pts)

x	y
0	2
1	3
2	6
3	11
4	18
5	27
6	38
7	51
8	66
9	83

2
3
6
11
18
27
38
51
66
+ 83

$\boxed{305 \text{ yd}}$

d. Let d = the day number, and y = the number of yards the ball is thrown. Write an equation to find d in terms of y. Use the form $d =$ $\sqrt{y-2}$. (4pts)

$y = d^2 + 2$

$y - 2 = d^2$

$\sqrt{y-2} = d$

e. On what day will Kellin throw the ball 80 yards? You must show this in terms of the equation you wrote in order to get full credit. You may round to the nearest hundredth of a day. (2pts)

$80 = x^2 + 2$

$78 = x^2$

$\boxed{\pm\sqrt{78} = x}$

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6) Solve each equation below: (3pts each)

a. $5x^2 - 12x + 9 = 0$

$5x^2 - 12x = -9$

$x^2 - \frac{12}{5}x = -\frac{9}{5}$

$\left(x - \frac{6}{5}\right)^2 = -\frac{9}{5} + \frac{36}{25}$

$\left(x - \frac{6}{5}\right)^2 = -\frac{45}{25} + \frac{36}{25}$

$\left(x - \frac{6}{5}\right)^2 = -\frac{9}{25}$

$x - \frac{6}{5} = \frac{\pm 3i}{5}$

$x = \frac{6 \pm 3i}{5}$

b. $4\log_4 3x = 26$

$\log_4 3x = 6.5$

$4^{6.5} = 3x$

c. $3(4^{2x} + 8) = 1500$

$4^{2x} + 8 = 500$

$4^{2x} = 492$

$2x \log 4 = \log 492$

$2x = \frac{\log 492}{\log 4}$

d. $(2x+5)^{\frac{3}{5}} = 27$

$\left((2x+5)^{\frac{3}{5}}\right)^{5/3} = 27^{5/3}$

$2x+5 = 243$

$2x = 238$

$\boxed{x = 119}$

e. $\sqrt{x+12} = 16$

$x+12 = 256$

$\boxed{x = 244}$

7) Simplify $\frac{8^{x^2}}{2^x}$ (2pts)

$\frac{8^{x^2}}{2^x}$

$\frac{(8^x)(8^x)}{2^x}$

$\frac{8^{2x}}{2^x}$

$\frac{(2^3)^{2x}}{2^x}$

$\frac{2^{6x}}{2^x}$

$\boxed{2^{5x}}$

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8) The following problems are not exactly what the ones on your test will be, but there will be a series of questions about quadratic functions.

a. Prove that the y-value of the vertex of a quadratic function is $\frac{-b^2+4ac}{4a}$. Show your work. (2pts)

Vertex $x = \frac{-b}{2a}$

$y = a\left(\frac{-b}{2a}\right)^2 + b\left(\frac{-b}{2a}\right) + c$

$y = \frac{ab^2}{4a^2} + \frac{-b^2}{2a} + \frac{2ac}{2a}$

$y = \frac{b^2}{4a} + \frac{-2b^2}{4a} + \frac{4ac}{4a}$

$y = \frac{-b^2+4ac}{4a}$

b. How can you determine from an equation if a quadratic function will have real or imaginary zeroes? (3pts)

If the vertex is above the x-axis and a is positive, or if the vertex is below the x-axis and a is negative, there will be imaginary zeroes. Otherwise, the zeroes will be real.

c. Which of the coefficients or constants in a quadratic function **cannot** be zero: a, b, or c? Why? (2pts)

a cannot be zero because then the function would be a linear function.

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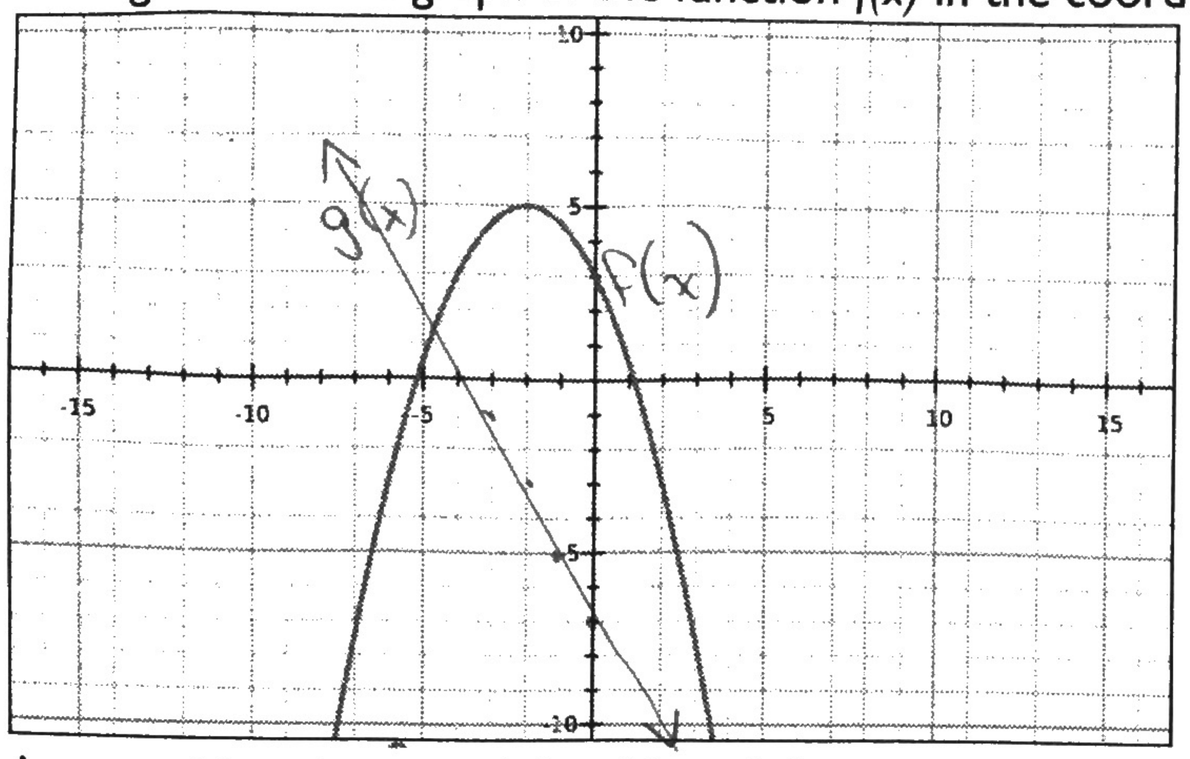
9) The figure shows a graph of the function $f(x)$ in the coordinate plane.



A second function g, is defined by $g(x) = -2x - 7$.

a. Which is greater, $f(2)$ or $g(2)$? (2pts)

f(2)

b. Which is greater, $f(0)$ or $g(0)$? (2pts)

f(0)

10) Multiply $(4 - 3i)(6 + i)$ (2pts)

a. Multiply $(4 - 3i)(6 + i)$

$24 - 14i - 3i^2$

$24 - 14i + 3$

$\boxed{27 - 14i}$

b. Find the equation of the quadratic function that has a zero at $3+2i$.

$(3+2i)(3-2i)$

$9 - 6i + 6i - 4i^2$

$9 + 4$

$\boxed{13}$

11) Simplify $72^{3/4}$ (2pts)

$\sqrt[4]{72^3}$

72
2 36
2 18
2 9
3 3

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12) Expand by using the properties of logarithms to rewrite the following expressions as a sum: (2pts)

$\log_3 4x^6y^3$

$\log_3 4 + 6\log_3 x + 3\log_3 y$

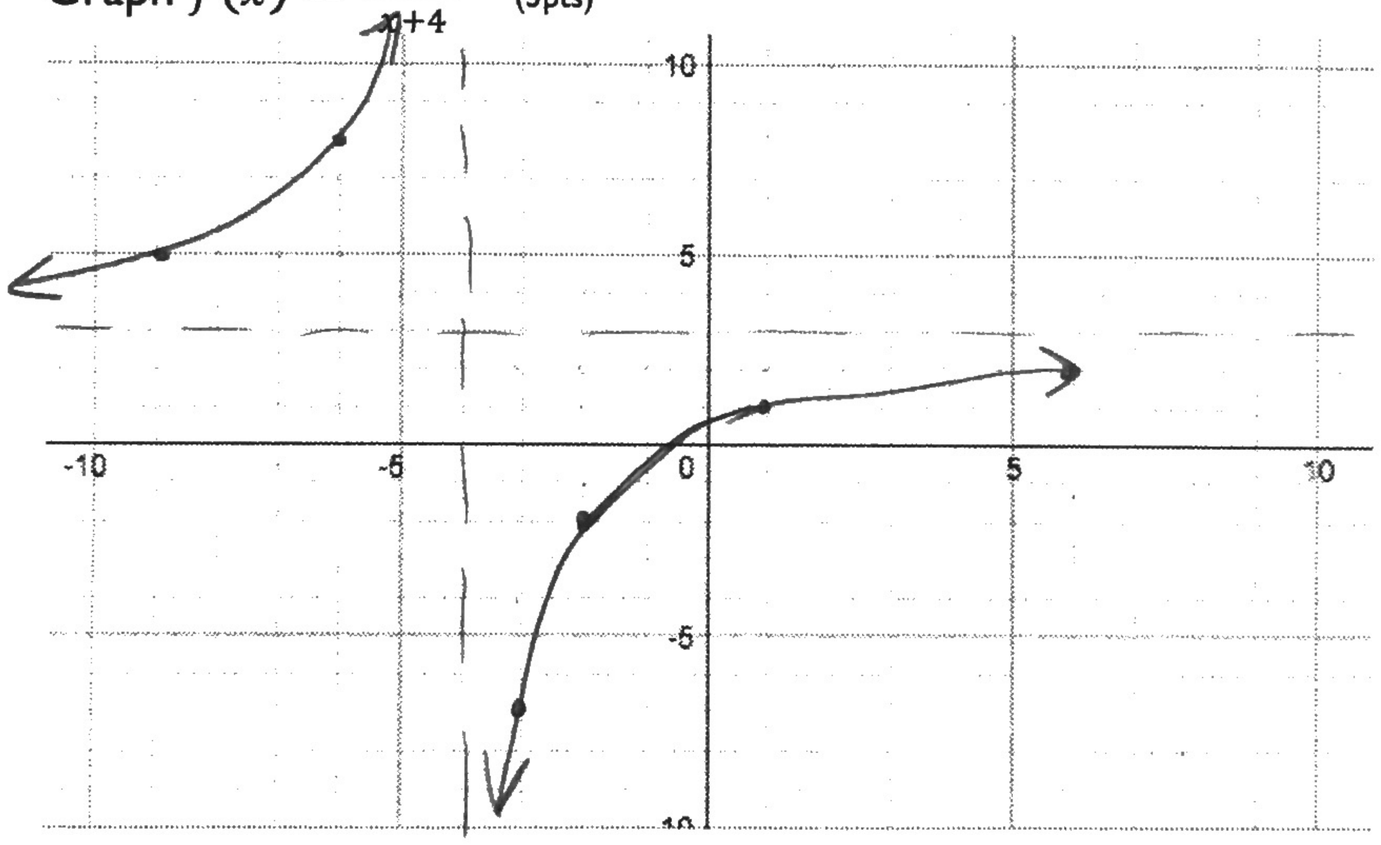
13) Condense the following expression: (2pts)

$3\log_5 x + 4\log_5 z$

$\log_5 (x^3 z^4)$

14)

a. Graph $f(x) = \frac{3x+2}{x+4}$ (3pts)



$$x+4 \overline{)\,3x+2}\quad 3$$
$$-(3x+12)$$
$$-10$$

$$\frac{-10}{x+4} \quad -3$$

b. What is an asymptote? Tell what it is, not where they are on this graph. (3pts)

An asymptote is a line that a function approaches but does not reach.

c. Which part of the rational function controls the vertical asymptote?

The denominator determines the vertical asymptote.

d. Suppose you try to solve $3x + 2 = 0$, in the context of this problem. What is the name of the point you have found? Why is in important? (2pts)

That is the x-intercept of the function.

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15) Simplify. Make sure to state any restrictions on the variables. (3pts)

$$\frac{6n+6}{n+9} \cdot \frac{n^2+6n-27}{6n+6}$$

$$\frac{6n+6}{n+9} \cdot \frac{(n+9)(n-3)}{6n+6}$$

$n-3$

$n \neq -9, -1$

16) Simplify. Make sure to state any restrictions on the variables. (3pts)

$$\frac{2}{n+8} + \frac{4}{n+1}$$

$$\frac{2n+2}{n^2+9n+8} + \frac{4n+32}{n^2+9n+8}$$

$\frac{6n+34}{n^2+9n+8}$ $n \neq -8, -1$

17) Solve. (3pts)

$$\frac{a-2}{a+3} - 1 = \frac{3}{a+2}$$

$$\frac{a-2}{a+3} - \frac{(a+3)}{a+3} = \frac{3}{a+2}$$

$$\frac{-5}{a+3} = \frac{3}{a+2}$$

$-5a - 10 = 3a + 9$

$-8a = 19$

$a = -\frac{19}{8}$